Poster II-60

Center for Grid-Enabled Medical Image Analysis

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With the increasing emphasis of medical research and clinical practice on complex datasets obtained from a variety of imaging modalities, there is a great need for advances in image processing, analysis, and storage capabilities. While having the ability to obtain this wealth of information has the potential to revolutionize our understanding of disease pathophysiology as well as the noninvasive diagnosis of disease in patients, the need to process, analyze and store this large amount of image data presents a great challenge.

In this abstract, we describe the Center for Grid-enabled Medical Image Analysis (CGMIA) that is being formed by the Biomedical Informatics Department, Davis Heart & Lung Research Institute, and Department of Radiology at Ohio State University (OSU). The goals of CGMIA are two-fold. The first goal is to create the software infrastructure needed to synthesize information obtained from the wealth of emerging imaging techniques and to use this information to better understand both mechanisms and diagnosis of disease. In areas ranging from fundamental basic to clinical research, software systems are needed to efficiently utilize powerful distributed computing resources to handle the massive data and processing requirements of very large image datasets at multiple sites. The sites may lie within a medical center and University or may span many geographically separated institutions. The second goal is to facilitate the inter- and cross-disciplinary training of computing, medical and engineering professionals. Professionals with superior inter-disciplinary training will be more adept at developing new acquisition, analysis and diagnosis techniques. The initial focus of the Center is on three interrelated projects: 1) *Development and Processing of High-resolution Cardiac Magnetic Resonance Imaging.* This project develops gated cardiac Electron paramagnetic resonance (EPR) spectroscopic imaging of free radicals in the heart, methods for simulation of EPR for better image quality, and post-processing techniques for synthesis of data. 2) *Functional Tumor Imaging using Dynamic Contrast Enhanced Methodologies.* This project develops methodologies and tools for acquisition and assessment of image datasets in functional tumor imaging. It focuses on use of Dynamic Contrast Enhanced MRI (DCE-MRI) and Contrast Enhanced Ultrasound (CE-US) to improve understanding of essential components of malignant and benign processes and relevance of angiogenesis for oncologic, cardiovascular and neuroscience-related imaging. 3) *A High-Performance Integrated Environment for Manipulation, Feature Analysis, and Visualization of Large Image Datasets.* This project develops the software infrastructure to make it easier to interactively explore and analyze very large spatio-temporal datasets in the Grid. It implements the core Grid services that will enable efficient access, sharing, and manipulation of data from multiple imaging modalities and accumulated results from texture and feature analysis of images in collaborative multi-institution environments. These projects make use of the techniques and tools being developed at OSU to support cancer and heart disease related research. The poster will present how these projects are being integrated into a collaborative environment and give an overview of techniques and tools developed and employed by these projects.

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